

## II. REMARKS

The Office Action dated June 16, 2006, has been received and carefully noted. The amendments made herein and the following remarks are submitted as a full and complete response thereto.

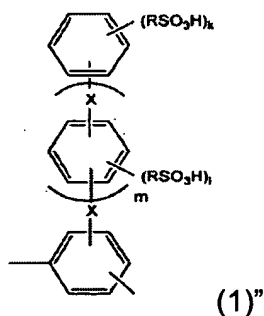
Claims 1-5 are pending.

At this time, claims 1 and 4 are amended to remove " $-(CF_2)_q-$ " and to direct that  $m$  is an integer of 1 to 10. Further, new claim 5 is added. Support for the amendments can be found in the specification and claims as originally filed. No new matter is added.

Claim 4 has been objected to because "a ':' appears at the end of Claim 4" (Office Action, page 2, lines 3-4). Applicants respectfully disagree with the Examiner's assertion, as Claim 4 ends with "and  $k + l \geq 1$ ." (emphasis added). Therefore, Applicants request reconsideration and withdrawal of the objection to claim 4.

Claims 1-4 have been rejected under 35 U.S.C. § 112, second paragraph, for the asserted indefiniteness. Applicants traverse the rejection.

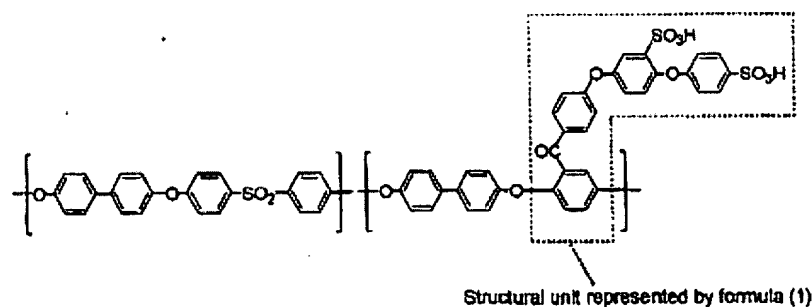
Applicants submit that present claim 1 is directed to a "polymer electrolyte comprising at least one polymer... said polymer comprising a repeating structural unit having one or both of an aromatic ring and a heterocyclic ring, and a repeating structural unit represented by the formula (1):



(present claim 1) (emphasis added). Applicants submit that both single bonds on the unsulfonated aryl group connect to other structures, or another repeating unit.

For example, claim 1 is directed to a "polymer comprising a repeating structural unit having one or both of an aromatic ring and a heterocyclic ring and a repeating structural unit represented by the formula (1)" (claim 1).

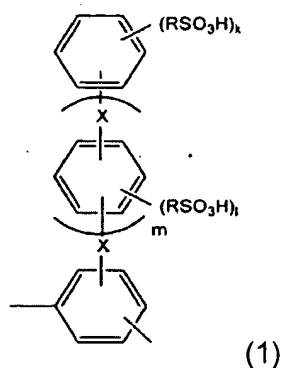
Applicants submit that this is demonstrated in Example 1:



For at least the above reasons, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1-4 under 35 U.S.C. § 112, second paragraph.

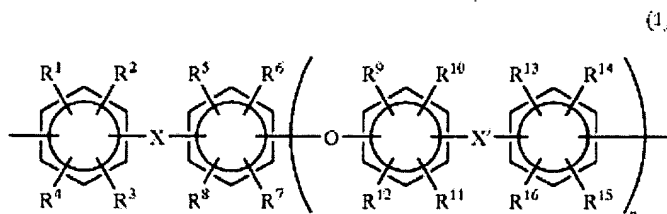
Claims 1-3 have been rejected on the ground of nonstatutory obviousness-type double patenting over claims 4 and 8 of Goto et al. (U.S. Patent No. 6,812,290). Applicants traverse this rejection.

The presently claimed invention is directed to a "polymer electrolyte comprising at least one polymer... said polymer comprising a repeating structure having one or both of an aromatic ring and a heterocyclic ring, and a repeating structural unit represented by formula (1):"



...wherein k denotes an integer of 0 to 5; l denotes an integer of 0 to 4; and  $k+l \geq 1$ " (present claim 1) (emphasis added). Applicants note that at least one of the rings must be substituted with  $-(RSO_3H)$ .

In contrast, Goto et al. is directed to a "proton-conductive membrane..., wherein the aromatic compound units (A) having a main chain containing one or more electron-withdrawing groups therein are structures represented by the following general formula (1):



wherein X and X<sup>1</sup> each represents at least one divalent electron-withdrawing group... [and] R<sup>1</sup> to R<sup>16</sup> may be the same or different and each represents a hydrogen atom, a halogen atom, an alkyl group, a halogenalkyl group, an allyl group, or an aryl group" (Goto et al., claim 4) (emphasis added). Thus, Goto et al. does not teach or suggest a  $-(RSO_3H)$  group in the side chain, let alone a polymer having the structural unit of formula (1) of the presently claimed invention.

According to the Manual of Patent Examining Procedure (MPEP), "[o]bviousness-type double patent requires rejection of an application claim when the

claimed subject matter is not patentably distinct from the subject matter claimed in a commonly owned patent..." (MPEP § 804(II)(B)(1)). Applicants submit that the obviousness-type double patenting rejection cannot stand, because the presently claimed invention is patentably distinct from Goto et al. As noted above, Goto et al. does not teach or suggest that the non-linking substituents of aromatic rings can be  $-(\text{RSO}_3\text{H})$ , as  $-(\text{RSO}_3\text{H})$  is not a hydrogen, a halogen, an alkyl group, a halogenalkyl, an allyl, or an aryl group. Further, Applicants submit that Goto et al. does not claim a "polymer electrolyte comprising at least one polymer selected from polyether, polyketone, polyetherketone, polysulfone, polyethersulfone, polyimide, polyetherimide, polybenzimidazole, polybenzothiazole, polybenzoxazole, polyphenylenesulfide, polyhydantoin, polyquinoxaline, polyquinoline, polyoxadiazole and polyparabanic acid" (claim 1). In other words, Applicants submit that Goto et al. does not claim a "polymer electrolyte comprising at least one polymer... said polymer comprising a repeating structure having one or both of an aromatic ring and a heterocyclic ring, and a repeating structural unit represented by formula (1)" (present claim 1).

For at least the above reasons, Applicants respectfully request reconsideration and withdrawal of the obviousness-type double patenting rejection of claims 1-3 over Goto et al.

Claims 1-4 have been rejected under 35 U.S.C. § 103(a) over Goto et al. Applicants traverse this rejection.

As discussed above, Applicants submit that Goto et al. neither teaches or suggests a polymer with a  $-(\text{RSO}_3\text{H})$  group in the side chain. Rather, Goto et al. merely suggests that the substituents can be "a hydrogen atom, a halogen atom, an alkyl group, a halogenalkyl group, an allyl group, or an aryl group" (Goto et al., col. 4,

lines 55-58). Further, as discussed above, Goto et al. does not teach or suggest a polymer electrolyte comprising at least one of the polymers of present claim 1.

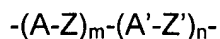
Applicants submit that one of ordinary skill in the art would not be motivated to modify Goto et al. to achieve the present invention without the benefit of hindsight, as there is no teaching or suggestion in Goto et al. of the polymers listed in claim 1, or to include  $-(\text{RSO}_3\text{H})$  in the side chain, much less how to achieve the unexpected advantages of the presently claimed invention (for example, "improved hot water resistance and radical resistance (service durability)" (specification, page 3, lines 20-21)).

As such, Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. § 103(a) over Goto et al.

Claims 1-4 have been rejected under 35 U.S.C. § 103(a) over Yoshimura et al. (EP 1 348 716). Applicants traverse this rejection.

As discussed above, Applicants submit that the presently claimed invention is directed to a "polymer electrolyte comprising at least one polymer... said polymer comprising a repeating structure having one or both of an aromatic ring and a heterocyclic ring, and a repeating structural unit represented by formula (1)" (claim 1) (emphasis added). Further, formula (1) of the present claims discloses that "R denotes a single bond or  $-(\text{CH}_2)_q-$  where q ranges from 1 to 10; m denotes an integer of 1 to 10" (present claims 1 and 4) (emphasis added).

Applicants submit that Yoshimura et al. merely discloses "an aromatic polymer comprising a super strong acid group in side chains" (Yoshimura et al., page 2, lines 1-2). Specifically, Yoshimura et al. discloses polymers of the following formula (1):



wherein "A represents a divalent aromatic group, A' represents a divalent aromatic

group comprising a super strong acid group as substituent, Z and Z' independently of one another represent a direct bond or divalent group, m and n represent the number of repeating units..." (Yoshimura et al., page 7, lines 25-30).

However, Applicants submit that in the polymer of  $-[A-Z]_m-[A'(-G-SO_3H)-Z']_n-$  represented by formula (1) and formula (2a) of Yoshimura et al., the variable "G" is an alkylene group, an aralkylene group, or an arylene group, in which some or all of the hydrogen atoms are substituted with fluorine atoms. As such, the variable "G" does not correspond to "R" in formula (1) of present claim 1 and 4. Further, as "m" in formula (1) of the presently claimed invention is 1 to 10, Applicants submit that the structure represented by  $-A'(-G-SO_3H)-$  in Yoshimura et al. is not the structure of formula (1).

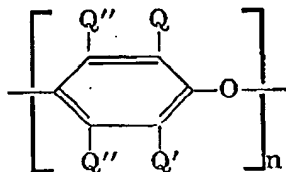
Further, Applicants submit that Yoshimura et al. does not teach or suggest that a polymer electrolyte containing "one or both of an aromatic ring and a heterocyclic ring" attached to an unsulphonated aryl group. In particular, Applicants submit that Yoshimura et al. neither teaches or discloses a polymer selected from "polyether, polyketone, polyetherketone, polysulfone, polyethersulfone, polyimide, polyetherimide, polybenzimidazole, polybenzothiazole, polybenzoxazole, polyphenylenesulfide, polyhydantoin, polyquinoxaline, polyquinoline, polyoxadiazole and polyparabanic acid" (claim 1), much less how to achieve the unexpected advantages of the presently claimed invention (for example, "improved hot water resistance and radical resistance (service durability)" (specification, page 3, lines 20-21)).

As Yoshimura et al. does not teach or suggest all of the elements of the presently claimed invention, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1-4 under 35 U.S.C. § 103(a) over Yoshimura et

al.

Claims 1-4 have been rejected under 35 U.S.C. 103(a) over Fox et al. (U.S. Patent No. 3,259,592). Applicants traverse this rejection.

Applicants submit that Fox et al. merely discloses "a cation exchange resin having a repeating structural unit of formula:



wherein... Q is a monovalent substituent selected from the group consisting of hydrogen, aliphatic hydrocarbon radicals free of a tertiary  $\alpha$ -carbon atom; Q' is a monovalent substituent which is the same as Q..., and Q'' is the same as Q' and in addition  $-\text{SO}_3\text{H}$ , there being at least one  $-\text{SO}_3\text{H}$  group in a substantial portion of the units" (Fox et al., claim 1).

Applicants submit that Fox et al. does not disclose a polymer having a sulfonic acid group in the side chain. Further, Applicants submit that Fox et al. does not disclose a "polymer electrolyte comprising at least one polymer selected from "polyether, polyketone, polyetherketone, polysulfone, polyethersulfone, polyimide, polyetherimide, polybenzimidazole, polybenzothiazole, polybenzoxazole, polyphenylenesulfide, polyhydantoin, polyquinoxaline, polyquinoline, polyoxadiazole and polyparabanic acid" (present claim 1), much less how to achieve the unexpected advantages of the presently claimed invention (for example, "improved hot water resistance and radical resistance (service durability))" (specification, page 3, lines 20-21)).

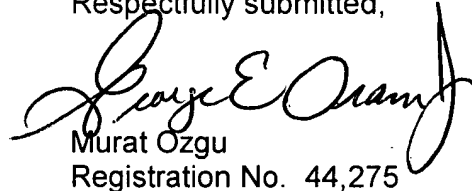
As such, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1-4 under 35 U.S.C. § 103(a) over Fox et al.

### III. CONCLUSION

Applicants respectfully submit that this application is in condition for allowance and such action is earnestly solicited. If the Examiner believes that anything further is desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number listed below to schedule a personal or telephone interview to discuss any remaining issues.

In the event this response is not timely filed, the Applicants hereby petition for an appropriate extension of time. The fee for this extension, along with any other additional fees which may be required with respect to this response, may be charged to Deposit Account No. 01-2300, referencing Attorney Docket No. 026035-00008.

Respectfully submitted,

  
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Enclosure: One (1) month Petition for Extension of Time